We claim:

1. A catalytically active composition comprising an active component comprising

   - Pd and Bi and
   - optionally an element selected from the group (a) consisting of Rh, Au, Sb, V, Cr, W, Mn, Fe, Co, Ni, Na, Cs and Ba.

2. A catalytically active composition comprising an active component comprising

   - Pd, Rh and Bi and
   - optionally an element selected from the group (a') consisting of Au, Sb, V, Cr, W, Mn, Fe, Co, Ni, Pt, Cu, Ag, Na, Cs, Mg, Ca and Ba.

3. The catalytically active composition according to claim 1 or 2, wherein the active component has been applied to at least one support material.

4. The catalytically active composition according to claim 3, wherein the support material or materials is/are selected from the group consisting of silicon carbides, silicon nitrides, carbonitrides, oxonitrides, oxocarbides, bismuth oxide, titanium oxide, zirconium oxide, boron nitride, aluminum oxide, silicates, aluminosilicates, zeolitic and zeolite-analogous materials, steatite, activated carbon, metal meshes, stainless steel meshes, steel meshes, and mixtures of two or more of the abovementioned support materials.

5. The catalytically active composition according to claim 3 or 4, wherein the total loading of the support material or materials with the active component according to any of claims 1 to 4 is less than 20% by weight.

6. The catalytically active composition according to any of claims 1 to 5, wherein the active component has the following formula:

$$Pd_aX_bBi_cY_dZ_e$$

where X = Rh and/or Au;

Y = Au, Rh, Pt, Ag, Cr, Co, Cu, W, V, Fe or Mn;

Z = Au, Rh, Pt, Ag, Cr, Co, Cu, W, V, Fe or Mn;

where the indices a, b, c, d, e indicate the mass ratios of the respective elements and $0.1 \leq a \leq 3$, $0 \leq b \leq 3$, $0.1 \leq c \leq 3$, $0 \leq d \leq 1$ and $0 \leq e \leq 1$.

7. The catalytically active composition according to claim 6, wherein the indices b and e are each 0 and Y = Au or Rh.

8. The catalytically active composition according to claim 6, wherein the indices d and e are each 0 and X = Rh.

9. The catalytically active composition according to claim 6, wherein the indices b, d and e are each 0.

10. The catalytically active composition according to claim 6, wherein the index d = 0 and X = Rh and Z = Ag or Pt.

11. The catalytically active composition according to claim 6, wherein the indices b and d are each 0 and Z = Co.

12. The catalytically active composition according to claim 6 comprising an active component of one of the following formulae

- $Pd_{0.5\text{-}1.0}Rh_{0.5\text{-}1.25}Bi_{1.25\text{-}1.75}Ag_{0.05\text{-}0.15}$
- $Pd_{0.5\text{-}1.0}Rh_{1.0\text{-}1.5}Bi_{0.75\text{-}1.25}Pt_{0.01\text{-}0.1}$
- $Pd_{0.25\text{-}0.5}Rh_{1.75\text{-}2.5}Bi_{0.25\text{-}0.5}Co_{0.01\text{-}0.1}$
- $Pd_{0.5\text{-}1.25}Rh_{0.5\text{-}1.25}Bi_{0.75\text{-}1.5}Cr_{0.01\text{-}0.1}$
- $Pd_{1.0\text{-}1.75}Rh_{0.25\text{-}0.75}Bi_{0.75\text{-}1.5}Pt_{0.0\text{-}0.15}Co_{0.01\text{-}0.1}$
- $Pd_{1.0\text{-}1.75}Rh_{0.25\text{-}0.75}Bi_{0.75\text{-}1.5}Pt_{0.05\text{-}0.15}$
- $Pd_{0.5\text{-}1.0}Rh_{1.0\text{-}1.75}Bi_{0.5\text{-}1.25}Ag_{0.03\text{-}0.15}Ca_{0.02\text{-}0.1}$
- $Pd_{0.4\text{-}1.0}Rh_{1.0\text{-}1.75}Bi_{0.75\text{-}1.25}Ag_{0.03\text{-}0.15}$
- $Pd_{1.25\text{-}1.75}Rh_{1.25\text{-}1.75}Co_{0.005\text{-}0.02}$
- $Pd_{0.4\text{-}1.0}Rh_{1.0\text{-}1.75}Bi_{0.75\text{-}1.25}$
- $Pd_{0.15\text{-}2.25}Rh_{0\text{-}2.5}Bi_{0.15\text{-}2.75}$

applied to at least one support material according to claim 4, where the indices indicate the mass ratios of the respective elements.

13. The catalytic composition according to any of claims 6 to 12, wherein the sum of the indices a + b + c = 3.

14. A process for preparing a catalytically active composition comprising at least one active component as defined in any of claims 1, 2 and 6 to 13, which comprises at least the following steps:

(i) precipitation of at least one active component from a solution comprising one of its salts;
(ii) drying of the product prepared in step (i);
(iii) calcination of the product dried in step (ii);
(iv) if appropriate, testing of the product calcined in step (iii).

15. A process for preparing a catalytically active composition according to any of claims 3 to 13, which comprises at least the following steps:

(α) application of a solution comprising at least one active component to at least one support material;
(β) drying of the product prepared in step (α);
(χ) calcination of the product dried in step (β);
(δ) if appropriate testing of the product calcined in step (χ).

16. The use of a catalytically active composition according to any of claims 1 to 13 for the dehydrogenation of hydrocarbons.

17. The use according to claim 16, wherein hydrocarbons from the group consisting of oxo-functionalized hydrocarbons are dehydrogenated.

18. The use according to claim 16, wherein hydrocarbons from the group consisting of acyclic and cyclic aldehydes and ketones are dehydrogenated.

19. The use according to claim 18, wherein the hydrocarbon is selected from the group consisting of cyclopentanone, butanone, butyraldehyde,

cyclohexanone and isovaleraldehyde.

20. The use according to any of claims 16-19, wherein the dehydrogenation is carried out in the presence of oxygen.

21. The use according to any of claims 16-20, wherein the dehydrogenation is carried out in the presence of oxygen and water.

22. The use according to either claim 20 or claim 21, wherein the hydrocarbon to oxygen ratio is in the range from 3 : 1 to 1 : 20.

23. The use according to either claim 21 or 22, wherein the hydrocarbon to water ratio is in the range from 3 : 1 to 1 : 50.

24. A process for dehydrogenating hydrocarbons by bringing the hydrocarbon into contact with a catalytically active composition according to any of claims 1 to 13.

25. The process according to claim 24, wherein hydrocarbons from the group consisting of acyclic and cyclic aldehydes and ketones are dehydrogenated.

26. The process according to claim 25, wherein the hydrocarbon is selected from the group consisting of cyclopentanone, butanone, butyraldehyde, cyclohexanone and valeraldehyde.

27. The process according to any of claims 24 to 26, wherein the dehydrogenation is carried out in the presence of oxygen and water, with the hydrocarbon to oxygen ratio being in the range from 3 : 1 to 1 : 20 and the hydrocarbon to water ratio being in the range from 3 : 1 to 1 : 50.